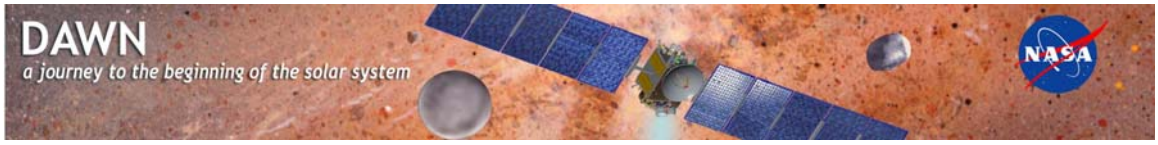

NASA's Dawn Mission:
Educational Materials Field Study

Introduction

On September 27, 2007, NASA's Dawn spacecraft began its journey to investigate Ceres and Vesta, two of the largest protoplanets remaining intact since their formations. The mission will address the role of size and water in determining the evolution of the planets by measuring their mass, shape, volume, and spin rate with imagery, and gravity. Through this investigation, scientists aim to characterize the conditions and processes of the solar system's earliest epoch.[1]

The Education and Public Outreach (E/PO) for the Dawn mission consists of a national team of E/PO specialists from the University of Maryland, New Roads Schools in California, and Mid-continent Research for Education and Learning (McREL). In support of the Dawn mission, this team develops and disseminates high quality resources and materials that reflect "best practices" in education. As such, Dawn E/PO curriculum materials are standards-driven, pedagogically appropriate, and designed to meet the needs of all students, including disadvantaged and underserved. Through their educational resources and materials, the Dawn E/PO team aims to improve students' understanding of the formation of the solar system, interest in solar-system science, and opportunities to conduct science within real-life contexts. The Dawn E/PO effort also intends to help science educators gain a better understanding of how to implement inquiry processes that lead to improved practices.

Study Purpose

The purpose of this field study is to ensure that the Dawn E/PO curriculum materials are of high quality and utility and reflect the needs of classroom science educators before they are disseminated to public and educator audiences. This study will allow the Dawn E/PO team to assess the appropriateness and effectiveness of the supplemental science materials in supporting science instruction and learning. This field study will specifically measure the impact of the Dawn E/PO curriculum materials on student understanding of and interest in physical science concepts related to an ion propulsion system. The Dawn E/PO team is currently recruiting high schools that are interested in participating as field-test sites for the *Ion Propulsion* module. This module is intended for high school 11th or 12th grade students enrolled in physics classes. Additionally, this module might be of interest to students as they conduct research in advanced technologies. As students interact with this module, they will gain an understanding of

- charges and relative charge
- momentum and frames of reference
- ionization and plasma
- how an ion propulsion system works

Dawn E/PO Field-test Sites

As part of the Dawn E/PO development process, all curriculum materials are pilot and field tested before broad dissemination. *Ion Propulsion* will be field-tested during the spring 2008 and fall 2008 semesters. As a result, the materials your school will field test will have been thoroughly reviewed and modified based on pilot-test results. Field-test participants will have the opportunity to use and provide additional feedback on these innovative supplemental science materials.

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[1] Dawn: A Journey to the Beginning of the Solar System (2002). The online site for the Dawn mission. Retrieved from the World Wide Web, June 5, 2003, http://www-ssc.igpp.ucla.edu/dawn/.

The ion propulsion module has many entry points into a high school physics curriculum. It can be used to enhance lessons on conservation of momentum, by having students experience positive charges attracting negative charges; or it can be inserted during instruction about electrostatic forces. Electric potential, electric fields, relative ground, EM, and even plasma physics are addressed. The module contains an exceptional review of ionization that can be taken to the level of using the ionization potential of Xenon to calculate the required KE of the emitted electrons. Ion Propulsion is a rich application of many key physics concepts and can be introduced at many points in the physics curriculum. Please help us determine its best use in physics classes by becoming a Dawn Ion Propulsion Field Test Teacher .

Design
The evaluation study will be conducted with 11th and 12th grade physics during the Spring and Fall of 2008. The following data collection mechanisms will be employed for the field study:

- Post-activity student interest and knowledge questionnaire
- Teacher informational online questionnaire (before implementation)
- Teacher module evaluation online survey (after implementation)
- Teacher and student demographics

Participation
Participating teachers will be expected to implement the materials as fully as possible and participate and support all data collection activities during the study. This is critical, given that the E/PO team's ability to improve the quality, utility, and effectiveness of the Dawn E/PO materials depends on the thoughtful and comprehensive feedback from participating teachers. In recognition of their participation, teachers will receive electronic copies of all E/PO field-test materials and designation as a NASA E/PO Field Associate.

No student, teacher, or school names will be used in reporting. If a reference is made to a school or teacher, it will be replaced with a pseudonym. All data will be reported in aggregated form, and no individual student data will be reported.

If you are interested in being considered for participation as a field-test site, please contact a member of the Dawn E/PO team or return the attached FAX form.

Contact Information
For information regarding the field study contact:

Dr. Stephanie Baird Wilkerson
Dawn E/PO Principal Evaluator, Magnolia Consulting, LLC
540.967.5540
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For information regarding Dawn E/PO materials and resources contact:

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Dawn E/PO Manager, New Roads School
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Dawn E/PO Lead Consultant, McREL
303.632.5620
jristvey@mcrel.org

magnolia consulting

McREL

magnolia consulting

FAX

LETTER OF INTEREST
FOR THE Dawn E/PO FIELD TEST

TO: Dr. Stephanie Wilkerson
FAX #: 540.967.5541

DATE: _____

FROM: _____
SCHOOL/DISTRICT: _____
PHONE: _____
ADDRESS: _____
EMAIL: _____

Dear Dawn E/PO:

We are very interested in participating in a field test of the Dawn E/PO supplemental science materials. We look forward to working closely with Magnolia Consulting and the Dawn E/PO team to determine whether our site will be one of the final sites chosen to participate in this study.

Sincerely,

Please answer the following questions:

1. Are you a representative of your school or district? ❑ school ❑ district
2. Are there other physics teachers in your school or district who may be interested in field testing? ❑ no ❑ yes (please list names and contact information)

3. What is the demographic location of your school?
   ❑ Urban ❑ Rural ❑ Suburban ❑ Other _____
4. If you are representing your school, who can we contact at the district to discuss this study?
   Contact name: _____
   title: _____
   phone: _____
   e-mail: _____